

INTERNAL DELIBERATIVE DOCUMENT OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY
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EPA-PNL-2689

Jenny
Thomas/DC/USEPA/US
07/30/2012 09:13 AM

To Jeff Frithsen
cc Phil North
bcc
Subject Re: Nushagak-Mulchatna Wood-Tickchit Land Trust

Hi Jeff - This one is included in our technical review comments Draft#3600 (I refer to it as BB Heritage Land Trust).

For your convenience, I'm cc'ing Phil on this email.

Jenny Thomas
Office of Wetlands, Oceans, and Watersheds
US Environmental Protection Agency
1200 Pennsylvania Ave NW
Washington, DC 20460
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BB Heritage Land Trust 3600DRAFT.pdfBB Heritage Land Trust 3600DRAFT Attachment 1.pdf

Jeff Frithsen

Jenny: Do you know which entry this is?

07/30/2012 08:11:07 AM

From: Jeff Frithsen/DC/USEPA/US
To: Jenny Thomas/DC/USEPA/US@EPA
Date: 07/30/2012 08:11 AM
Subject: Nushagak-Mulchatna Wood-Tickchit Land Trust

Jenny:

Do you know which entry this is?

Jeff

*Jeffrey B. Frithsen, Ph.D.
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National Center for Environmental Assessment, 8623-P
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----- Forwarded by Jeff Frithsen/DC/USEPA/US on 07/30/2012 08:10 AM -----

From: Phil North/R10/USEPA/US
To: Jeff Frithsen/DC/USEPA/US
Date: 07/28/2012 07:22 PM
Subject: Can you send a few more?

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Can you also send me the comments for the Nushagak-Mulchatna Wood-Tickchit Land Trust? They include some arguments for restrictions that I would like to see.

Phillip North
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"To protect your rivers, protect your mountains."

STANDARDS AND PRACTICES FOR ENVIRONMENTALLY RESPONSIBLE MINING IN THE NUSHAGAK RIVER WATERSHED

**A POLICY STATEMENT OF
THE NUSHAGAK – MULCHATNA WATERSHED COUNCIL
2011**



This document outlines a set of standards, practices and guidelines for environmentally responsible mining within the Nushagak River Watershed in Southwest Alaska. These standards, practices and guidelines have been developed by the Nushagak – Mulchatna Watershed Council.

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INTRODUCTION

The Nushagak-Mulchatna Watershed Council (Council) was formed in 1998. The Council is an association of tribes, local governments and landowners who have joined together to protect the quality of the waters of the Nushagak River Watershed. In 2005 the Council undertook a process to develop a land and water conservation plan focusing primarily on the protection of habitat for salmon and other resources important for the subsistence needs of watershed residents. The process was completed and the Council approved and published the *Nushagak River Watershed Traditional Use Area Conservation Plan* in November of 2007 (Conservation Plan). The Conservation Plan incorporates a baseline of traditional ecological information gathered from the communities and indigenous residents of the watershed.

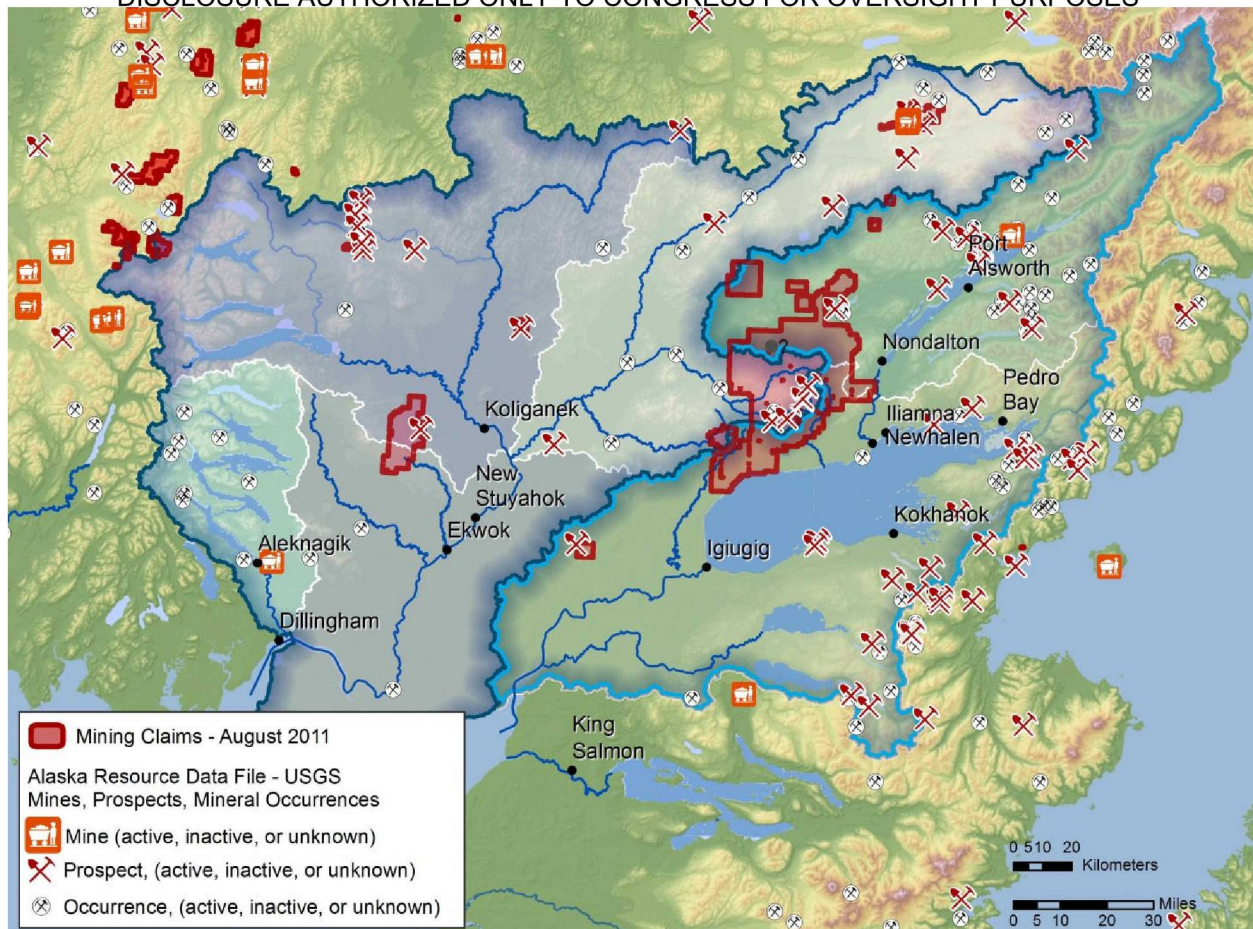
The Conservation Plan identified potential threats to habitat within the watershed and outlined a series of strategic actions to address those threats. One of the potential threats identified was mining, in particular, the potential development of large scale open pit gold and copper mines in the watershed. To address the potential impacts that mining could have on the habitat in the watershed the Council determined that a key strategic action would be to undertake an assessment of the risks to salmon posed by the development of large scale gold and copper mining in the headwater streams of the watershed. Such a risk assessment was undertaken by The Nature Conservancy in 2008 and completed in 2010. The report entitled *An Assessment of Ecological Risk to Wild Salmon Systems from Large-scale Mining in the Nushagak and Kvichak Watersheds of the Bristol Bay Basin*, Ecology & Environment was published in October of 2010.

Upon completion of the risk assessment the next strategic action identified in the Conservation Plan is to address the risks identified in the assessment through the development of a framework for responsible mining in the watershed.

The Nushagak-Mulchatna Watershed Council adopts the following standards and practices as a framework for environmentally responsible mining to guide owners of property considering mineral development, and the mining industry in the exploration and development of mineral resources. These standards are also designed to assist state, federal and local government agencies in the permitting and oversight of such activities within the Nushagak River watershed. These standards and practices are adapted from the *Ten Principles of Sustainable Development Framework adopted by the International Council on Mining and Minerals*, <http://www.icmm.com/our-work/sustainable-development-framework/10-principles>; and *A Framework for Responsible Mining: A Guide to Evolving Standards*, Marta Miranda, David Chambers, and Catherine Coumans (October 19, 2005). <http://www.csp2.org/reports/Framework%20for%20Responsible%20Mining.pdf> In addition some of the standards and practices are derived from the results and observations of research projects undertaken to fulfill the strategic actions outlined in The Conservation Plan, see e.g. Woody and O'Neal, *Fish Surveys in Headwater Streams of the Nushagak and Kvichak River Drainages, Bristol Bay, Alaska 2008 – 2010*, The Nature Conservancy (2011), and to address the risks identified in *An Assessment of Ecological Risk to Wild Salmon Systems from Large-scale Mining in the Nushagak and Kvichak Watersheds of the Bristol Bay Basin*, Ecology & Environment, (October, 2010).

These standards and practices have also been developed with an awareness of the scientific literature regarding the resilience and vulnerability of wild salmon and the growing understanding of the role freshwater habitat plays in the development of sustainable wild salmon populations, particularly in Southwest Alaska, see e.g. Schlindler, et, al. *Population Diversity and the Portfolio Effect in an Exploited Species*, Nature, pp 609 – 612 (June 3, 2010).

Accordingly, the people of the Nushagak River Watershed and the organizations that represent and serve them may refuse to give their consent, which includes the denial of permission to use their lands and resources, to any mineral development organization, mining company or enterprise that fails to conduct their activities in accordance with the standards and practices set forth in this document.



Mineral claims and prospects within the Nushagak River Watershed as of August, 2011

I. Standards and Practices for Free, Prior and Informed Consent

- A. Mining companies should adhere to the principles of Free, Prior and Informed Consent as those principles are articulated in the *United Nations Declaration on the Rights of Indigenous Peoples* (2007) to which the United States became a signatory in December of 2010 and the *Position Statement of the International Council on Mining and Metals* (ICMM – May 2008).

Free, Prior and Informed Consent is defined as follows:

- Free – people are able to freely make decisions without coercion, intimidation or manipulation;
- Prior – sufficient time is allocated for people to be involved in the decision-making process before key project decisions are made and impacts occur;
- Informed – people are fully informed about the project and its potential impacts and benefits, and the various perspectives regarding the project (both positive and negative);
- Consent – there are effective processes for affected indigenous peoples to approve or withhold their consent, consistent with their decision-making processes, and that their decisions are respected and upheld.

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Commitment #3 of the Position Statement of the International Council on Mining and Metals provides:

Engagement will be based on honest and open provision of information, and in a form that is accessible to Indigenous Peoples. Engagement will begin at the earliest possible stage of potential mining activities, prior to substantive on-the-ground exploration. Engagement, wherever possible, will be undertaken through traditional authorities within communities and with respect for traditional decision-making structures and processes.

Commitment #9 of the Position Statement of the International Council on Mining and Metals provides:

ICMM members recognize that, following consultation with local people and relevant authorities, a decision may sometimes be made not to proceed with development or exploration even if this is legally permitted.

COMMENT: Most of the indigenous residents of the Nushagak River Watershed are represented by Federally recognized tribal governments. The indigenous residents of the watershed also have interests that are represented by village and regional corporations established under the Alaska Native Claims Settlement Act of 1971. The indigenous and non-indigenous residents of the watershed may also have interests represented by local governments organized under the laws of the State of Alaska. All of these organizations should be informed of mineral exploration and development activities within the watershed and engaged in the process of consent. References in this document to residents or communities of the watershed include these organizations.

Residents of the watershed should be afforded sufficient time to understand the information provided by a mining company. Sufficient time should be a measure of the time it took a mining company to generate the information for exploration or a proposed mine in relation to the time it can reasonably be expected for residents to seek and engage their own experts to independently evaluate, verify and express opinions on the adequacy and accuracy of information provided by a mining company, especially as that information relates to environmental baseline studies and the potential impact of exploration or proposed mining activity on the water quality and quantity, and the habitat of the watershed.

Information should be provided in a format that takes advantage of modern technology. Paper reports or the equivalent need to be provided but alone are insufficient. Information should be released in a digital format (tabular databases, GIS files, metadata, etc.) that can be easily searched, analyzed and independently evaluated particularly as that information relates to potentially impacted public and private resources such as land, air, water, fish, and wildlife.

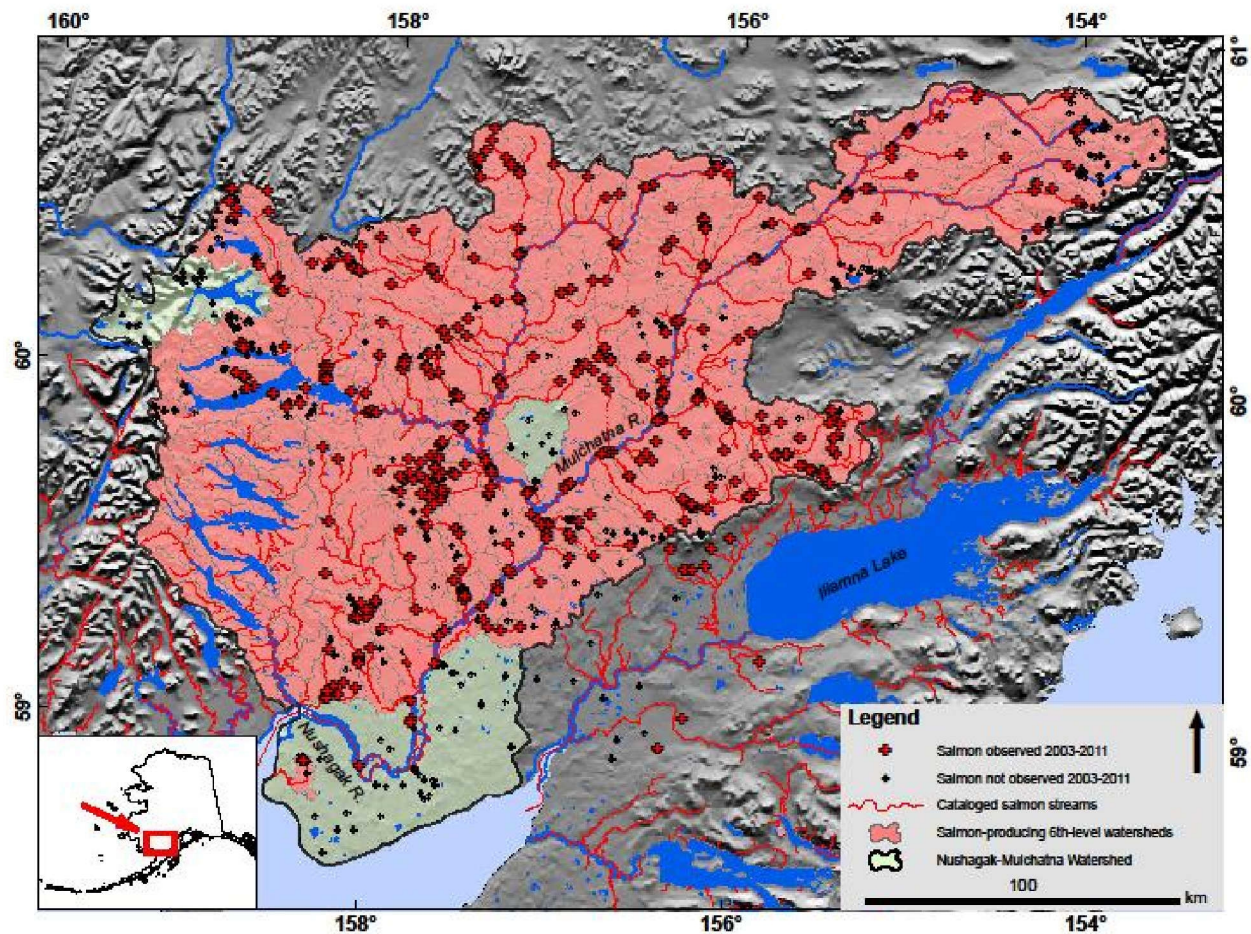
II. Standards and Practices for Exploration Activities

- A. No permit for exploration, including Temporary Water Use Permits issued by the Alaska Department of Natural Resources (ADNR), should be issued without actual notice to the communities and residents of the watershed, a ninety day comment period and at least one public hearing in Dillingham and one public hearing in the community closest to the proposed exploratory activity.

COMMENT: The details of any mineral exploration project and the potential impacts of that activity should be made publically available before exploration begins.

- B. Exploration activities should only be permitted, including the issuance of Temporary Water Use Permits by ADNR, upon a finding by the Commissioner of the Alaska Department of Fish and Game (ADF&G) that no significant harm will result to anadromous streams within the area proposed for exploration.

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 COMMENT: For the purpose of such a finding the Commissioner of ADG&G should assume that any stream reach within the area of exploration with a 10% gradient or less in one of the red shaded sixth level hydrologic units on the following map should be presumed to be an anadromous stream that produces salmon. Dolly Varden in the watershed may also be anadromous and may rear in streams up to 14% gradient.



Salmon producing 6th level basins within the Nushagak River watershed

- C. During the exploration phase mining companies should conduct fish distribution surveys of all waterbodies that could be affected by eventual mine development and associated activities. Until such time as more accurate tools are available for predicting the location of anadromous streams, mining companies should survey all stream reaches within the footprint of the potential mine and all stream reaches within one mile of any planned development. Fish distribution surveys should comply with protocols developed by ADF&G and reports of surveys should be provided to ADF&G and nominations made to the Anadromous Waters Catalog at the end of each survey season for any waterbody in which anadromous fish were documented.
- D. During the exploration phase mining companies should not file water withdrawal applications with the Alaska Department of Natural Resources for water to be used in the development, operation and closure of a mine. Such applications should only be filed upon completion of the mine plan that will be submitted for permitting.

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Priority for water use within all waters of the Nushagak River Watershed should be accorded to the fish that inhabit these waters. Mining companies should provide the Nushagak-Mulchanta Watershed Council with sufficient funds to file and perfect instream flow reservations under Alaska law to protect minimum flows required for fish for any waterbodies that may be affected by water withdrawals for mine development, operation and closure.

- E. Mining companies should provide adequate financial assurances to pay for prompt cleanup, reclamation and long term monitoring and maintenance that could result from exploration activities.

COMMENT: Self-bonding or corporate guarantees should not be permitted. Escrowed Funds or surety bonds provided by independent highly rated surety agencies are acceptable forms of guarantees.

III. Standards and Practices for Mine Development and Operation

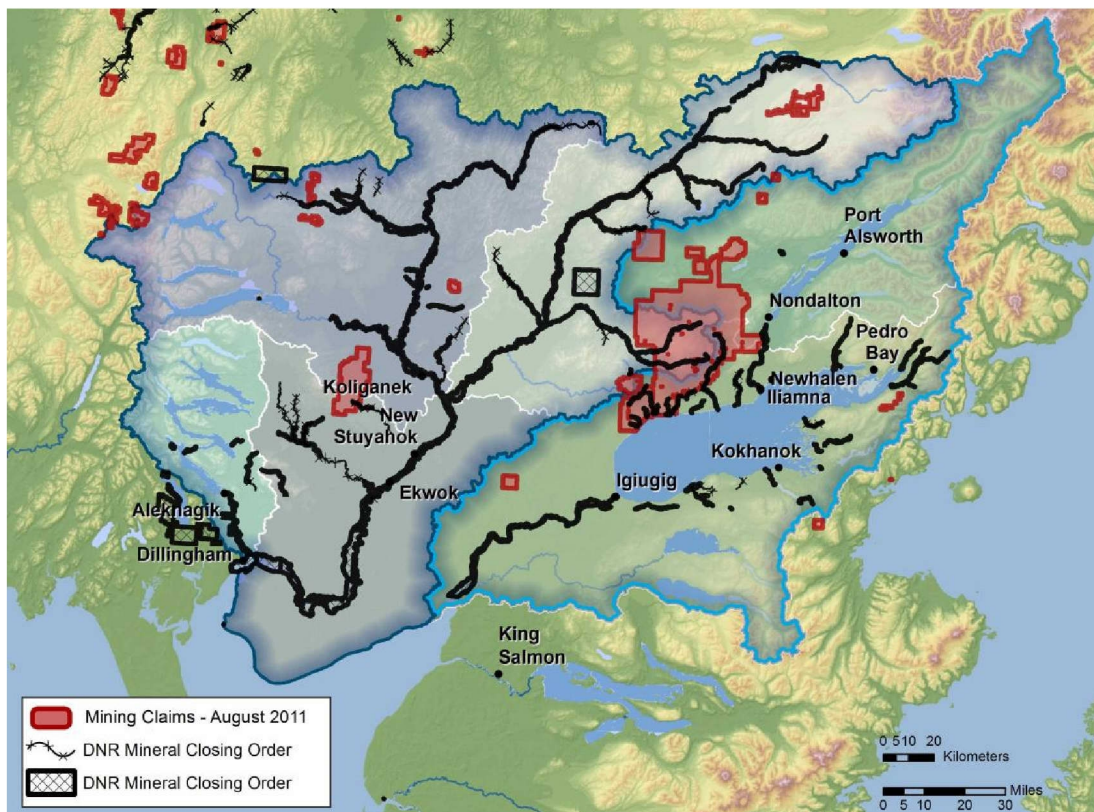
- A. No mine should be permitted within the Nushagak River Watershed that will require active management in perpetuity to avoid environmental contamination. Before any mine is permitted in the Nushagak River Watershed an independent qualified professional shall certify that active management will not be required in perpetuity.

COMMENT: Mines in this watershed should not pose an eternal threat of environmental contamination. Such a threat is deemed to exist if active measures like water treatment, groundwater pumping or other means of mechanical, chemical or human intervention will be necessary in perpetuity to prevent toxic effluents from escaping beyond the boundary of the mine. Such measures are considered active management and are distinguished from more passive activities like monitoring, occasional inspection, and the incidental maintenance that would still be necessary for a closed and sealed mine.

- B. No mine should be permitted within the Nushagak River Watershed that destroys or impairs habitat that supports a life phase of a particular anadromous or resident fish species if the sustained abundance or genetic diversity of that species may be significantly compromised.
- C. The Commissioner of ADF&G should not consider issuing a permit for the destruction, relocation or removal of an anadromous water body within the Nushagak River watershed without sufficient notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the waterbody proposed for destruction or removal. The Commissioner of ADF&G should not issue a permit for the destruction, relocation or removal of an anadromous water body without clear and convincing evidence that the destruction or removal will not result in a significant loss to the sustained abundance or genetic diversity of any salmon species.
- D. No mine should be permitted within the Nushagak River watershed that will require water withdrawals that may exceed ecological flow needs for salmon and other fish.
- E. The Commissioner of the Alaska Department of Natural Resources (ADNR) should not consider issuing a permit for the withdrawal of water to support the development and operation of a mine from any waterbody in the Nushagak River Watershed until an instream flow reservation as provided in Alaska Law to protect fish has been filed and perfected by ADF&G, the Nushagak-Mulchatna Watershed Council or a partner organization. The Commissioner of Natural Resources should not reduce an instream flow reservation to protect fish without clear and convincing evidence that the reduction of instream flow will not destroy or impair habitat that supports a life phase of a particular salmon species if the sustained abundance or genetic diversity of that species may be compromised.

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- F. The Commissioner of ADNRC shall not reduce an instream flow reservation for fish without sufficient notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the waterbody affected.
- G. No mine should be permitted within the Nushagak River watershed that will require mixing zones.
- H. No mine should be permitted within the Nushagak River watershed without a plan to control and monitor dust emissions during construction and operation that has been tested and demonstrated to be effective for the conditions to be encountered on location.
- I. No mine should be permitted within the Nushagak River Watershed that could result in acid mine drainage during operation or after closure unless the risk of such drainage can be eliminated by methods proven to be effective at mines of comparable size, scale and location.
- J. No mine should be permitted in areas of the Nushagak River watershed that are or were subject to mineral closing orders.



COMMENT: Acid mine drainage is a risk associated with sulfide mines that has contributed to the impairment of wild fish populations in other parts of the world. Mining companies should conduct adequate pre-mining sampling and analysis for acid-producing minerals, based on accepted practices and appropriately documented, site-specific professional judgment. Sampling and analysis should be conducted in accordance with the best available practices and techniques.

The Nushagak River watershed is not a place to experiment with untested methods for controlling acid mine drainage. The Nushagak River watershed is characterized by extensive wetlands, moderate precipitation, numerous small streams, interconnections between ground and surface water, a high water

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table, and over geological formations that are susceptible to ground water movement. A method shown to be effective for controlling acid mine drainage in a drier climate is not sufficient. Any method proposed for controlling acid mine drainage should be proven effective in a watershed with similar characteristics to the Nushagak River Watershed.

- K. No mine should be permitted within the Nushagak River Watershed that requires shallow-water submarine waste disposal.

COMMENT: The rivers and tributary streams, shallow lakes and ponds of the watershed should not be used for the disposal of mine waste.

- L. No mine should be permitted within the Nushagak River Watershed that requires deep-water submarine waste disposal unless such waste disposal will be environmentally benign. No regulatory authority should consider issuing a permit for deep-water waste disposal within the Nushagak River Watershed without actual notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the waterbody proposed for deep water waste disposal. A permit for deep-water submarine waste disposal should not be issued unless there is clear and convincing evidence that the disposal will not compromise the sustained abundance or genetic diversity of any anadromous or resident fish species within the waterbody proposed for deep water waste disposal.
- M. No mine should be permitted within the Nushagak River Watershed that requires the use of cyanide unless the mine operator is a signatory to the *International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold*, <http://www.cyanidecode.org/>.
- N. Tailings impoundments and waste rock dumps should be constructed in a manner that as a first priority eliminates the release of contaminants by installing liners if seepage could result in groundwater contamination. In addition, waste facilities should have adequate monitoring and seepage collection systems to detect and collect any contaminants released in the immediate vicinity.
- O. Mine dewatering should be designed in a manner that as a first priority eliminates impacts on ground and surface waters, including seeps and springs.
- P. Mining companies should prepare detailed plans for preventing and responding to low risk but high impact events. The plan should regularly be revised and updated to incorporate improvements in prevention and response practices and technology, and to account for changes in operation that occur over the life of the mine. Response technology should be proven effective in similar locales and during all seasons. At a minimum such plans must be revised every five years or concurrently with regulatory approval of changes to the design or operation of the mine. Revised plans should not be approved without sufficient notice to the communities and residents of the watershed, a 60 day comment period, and at least one public hearing in Dillingham and one public hearing in the community most likely to be the first to suffer impacts from an incident (e.g. community immediately downstream of a tailings dam).

COMMENT: Some incidents associated with mines, like slurry pipeline breaks or tailings dam failures, may be very unlikely, but if they occur the impacts are potentially large. Mining companies should be required to develop detailed prevention and response contingency plans for such low probability but high impact events as well as provide funds in escrow or independent financial assurances for the payment of costs associated with response to the incident and rehabilitation of the environment damaged.

- Q. If permit violations occur, mining companies must commit to rapidly implementing corrections.

- R. The environmental performance of any mine in the watershed and the effectiveness of the regulatory agencies responsible for regulating mines should be addressed in an independent environmental audit. These audits should be conducted every three years or immediately after any permit violation or pollution event, and the results should be made immediately available to residents and communities of the watershed. Recommendations made in the audit must be implemented within a reasonable time.
- S. The residents, communities and representative bodies of the Nushagak River Watershed should have the right to independent monitoring and oversight of the environmental performance of a mine. Mining companies should cover the reasonable costs of such oversight in an annual minimum amount paid to the Nushagak-Mulchatna Watershed Council to be determined prior to mine operation.



IV. Standards and Practices for Reclamation and Closure

- A. Mining companies should develop a reclamation and closure plan before operations begin that includes detailed cost estimates, plus ten percent, with consideration for inflation. Reclamation and closure plans should address post-closure monitoring and maintenance of all mine facilities, including surface and underground mine workings, tailings, and waste disposal facilities.

The plan should be periodically revised and updated to incorporate improvements in reclamation practices and technology, to account for changes in operation that occur over the life of the mine, and to take into account potential increases in reclamation and closure costs (but not potential decreases). The residents and communities of the Nushagak River Watershed should have the right to comment on the adequacy of the reclamation and closure plan. A decision to approve a reclamation and closure plan should not be made prior to actual notice to the communities and residents of the watershed, a 120 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the mine.

- B. Mining companies should restore to the greatest extent physically possible all disturbed areas to pre-mine conditions, including, but not limited to topographic and hydrologic features.
- C. Mining companies should re-contour and stabilize disturbed areas. This should include the salvage, storage, and replacement of topsoil or other acceptable growth medium. Material from the mine site should be tested for contaminants before being used for reclamation. Quantitative

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standards should be established for re-vegetation in the reclamation plan—and clear mitigation measures should be defined and implemented if these standards are not met. Native vegetation should be used in reclamation.

- D. Where subsidence is possible, mining companies should backfill underground mine workings to prevent such subsidence.
- E. Underground mine workings and pits should be backfilled to minimize the size of waste and tailings disposal facilities.
- F. Underground mine workings should be tested and regularly monitored for contamination.

Comment: Financial expense or economic burden should not be a consideration as to whether restoration is possible. Rather the question to be resolved with respect to restoration is whether it is possible to engineer restoration to pre-mine conditions without causing more environmental damage.

V. Standards and Practices for Financial Guarantees

- A. Financial sureties should be reviewed and upgraded every two years by the ADNR and the results of the review should be publicly disclosed.
- B. The residents and communities of the Nushagak River Watershed should have the right to comment on the the adequacy of the financial surety, and completion of reclamation activities prior to release of the financial surety.
- C. Financial surety instruments should be independently guaranteed, reliable, and readily liquid. Sureties should be regularly evaluated by independent analysts using accepted accounting methods. Self-bonding or corporate guarantees should not be permitted for financial surety.
- D. Financial sureties should not be released until reclamation and closure are complete, all impacts have been mitigated, and cleanup has been shown to be effective for a sufficient period of time, but no less than ten years, after mine closure. Sureties should not be released without sufficient notice to the communities and residents of the watershed, a 90 day comment period, and at least one public hearing in Dillingham and one public hearing in the community closest to the mine.



Mapping Traditional Knowledge in New Stuyahok 2006

VI. Standards and Practices for Post-Closure and Post-Closure Monitoring.

- A. Mining companies should endow an independent fund from which the cost of monitoring and maintenance of the closed mine can be paid. The adequacy of the fund should be reviewed by an independent auditor periodically and no less than every three years during mine operation to determine whether the fund is keeping pace with inflation and changes in reclamation and closure that may result from changes in mine operation. To the extent the fund is determined by the auditor to be insufficient to meet the future costs of monitoring and maintenance the mine operator shall pay into the fund the amount recommended by the auditor.

VII. The Principle of Precaution Shall Be Applied to Mineral Exploration and Development Activities in the Nushagak River Watershed

- A. Within the Nushagak River Watershed there should be no presumption in favor of mineral exploration or development. Where there is scientific uncertainty concerning the impacts of a proposed mineral exploration or development activity on the water quality, aquatic and subsistence resources of the watershed it should not be assumed that such activities can proceed until and unless there is clear evidence the activities are harmful. Rather, such activities should not proceed unless there is clear and convincing evidence the activities are environmentally safe. The burden shall be on the proponent of mineral exploration or development to demonstrate the activities will not result in significant impact to the water quality or the sustained abundance or genetic diversity of any anadromous or resident fish species that may be affected by the activity.

COMMENT: The livelihood and culture of the people of the Nushagak River Watershed are intimately tied to the water and aquatic resources of the watershed, in particular the wild salmon and resident fish species like whitefish, trout and Dolly Varden. The preservation of wild fish species and the clean water upon which they depend is the mission of the Nushagak-Mulchatna Watershed Council.

In the face of potential mineral development activity, the people of the watershed should not be placed in the impossible position of proving a proposed mineral development activity will harm fish or pollute the water. Rather, the burden shall be with the proponents to prove to the satisfaction of the people of the watershed, as they are represented by the organizations mentioned in the comment to Standard I, that the proposed activities are safe and will not pollute the water or cause significant harm to the fish species and other subsistence resources of the watershed. Failure to do so may result in the people of the watershed withholding their consent to mineral development and refusing permission to use their lands and other resources.

PASSED AND APPROVED by the Nushagak-Mulchatna Watershed Council on October 25, 2011.



Luki Akelkok, Chairman

BRISTOL BAY HERITAGE LAND TRUST

P.O. BOX 1388, DILLINGHAM, AK 99576

To: Office of Environmental Information (OEI) Docket (Mail Code: 2822T) Docket #
EPA-HQ-ORD-2012-0276 U.S. Environmental Protection Agency 1200 Pennsylvania
Ave., N.W. Washington, DC 20460

From: Tim Troll, Executive Director of the Bristol Bay Heritage Land Trust

**Re: Comments on An Assessment of Potential Mining Impacts on Salmon
Ecosystems of Bristol Bay, Alaska – External Review Draft May12 (Docket # EPA-
HQ-ORD-2012-0276)**

BACKGROUND:

My name is Tim Troll. I am presently the Executive Director of The Bristol Bay Heritage Land Trust (Land Trust). The Land Trust was incorporated in 2000 as the Nushagak-Mulchatna / Wood-Tikchik Land Trust. The Board of Directors at its meeting in June of 2012 expanded the service area of the Land Trust to include all of Bristol Bay and changed the name to reflect that expansion.

Since its inception the Land Trust has helped preserve nearly 22,000 acres in the Nushagak River Watershed, and has initiated other conservation efforts and programs to protect the wild salmon resources of the entire Bristol Bay region. Perhaps most significant of the latter is its lead role in the formation and operation of the Southwest Alaska Salmon Habitat Partnership, a collaboration of federal and state agencies, NGO's and local organizations. The Partnership was given official recognition in 2008 under the U.S. Fish & Wildlife Service's National Fish Habitat Initiative by the National Fish Habitat Board. The Partnership now receives federal funding to support scientific research and programs directed to understanding and protecting salmon habitat in Southwest Alaska. I currently serve on the Partnership Science and Technical Committee and as presiding chairman of the Partnership Steering Committee.

My connection to Bristol Bay began in 1996 when I accepted the position of CEO for Choggiung LTD, the ANCSA village corporation for the communities of Dillingham, Ekuk and Portage Creek. I served in that capacity for six years. It was during my tenure that the Choggiung LTD Board of Directors led the effort to create the Land Trust.

For the last seven years I was employed by The Nature Conservancy as the Southwest Alaska Program Director. In that capacity I assembled and raised funds to support a team of scientists to conduct independent research to understand the potential affects of a large-scale open pit mine in the headwaters of the Nushagak and Kvichak watersheds. These investigations included studies of fish distribution, water quality, instream flow, potential copper toxicity, macroinvertebrates, hydrology and an Ecological Risk Assessment, among others. Reports from all of these investigations have been provided to the EPA by The Nature Conservancy.

For the last fifteen years my work in Bristol Bay has involved a close engagement with the communities of the Nushagak River watershed. The Land Trust has acquired properties in the watershed and I serve as volunteer staff for the Nushagak-Mulchatna Watershed Council, a group formed around the same time as the Land Trust. Active members of the Watershed Council include the ANCSA village corporations, tribes and municipalities in the Nushagak River drainage. In 2005, with assistance from the Bristol Bay Native Association I helped the Council collect traditional ecological knowledge from the communities of the Nushagak River to lay a foundation for a conservation plan to protect the critical resources upon which residents of the watershed subsist. In 2007 the Council published the *Nushagak River Watershed Traditional Use Area Conservation Plan*. The plan was updated in 2012 and that update includes a document entitled *Standards and Practices for Environmentally Responsible Mining in the Nushagak River Watershed*. Both documents have been provided to the EPA. I will be referring to them in my comments.

These comments are made on behalf of myself and the Bristol Bay Heritage Land Trust and supplement those I made at the public meeting in Anchorage on June 4, 2012.

COMMENTS

I would like to organize my comments around the three questions the Bristol Bay Assessment was charged to answer:

1. Is the Bristol Bay salmon fishery the one of a kind, world class fishery that it is depicted to be?
2. What are the existing and potential risks to Bristol Bay's salmon fishery associated with large-scale development activities such as hard rock mining?
3. Are there technologies or practices that will mitigate these risks?

1. THE FISHERY

EPA'S assessment that the Bristol Bay fishery is world class is consistent with a similar assessment of the Alaska Department of Natural Resources justifying Mineral Closing Order 393 issued in 1984 and still in effect that closes the anadromous portions of the Koktuli River and Upper Talarik Creek and many other streams in Bristol Bay to mineral entry.

The Bristol Bay Assessment concludes: "... the Bristol Bay region is a unique environment supporting world-class Pacific salmon populations. However, the region takes on even greater significance when one considers the status and condition of Pacific salmon populations throughout their native geographic distributions." *Bristol Bay Assessment* p. 2-25.

Over the last fifty years the same observation has been used to justify a series of federal and state actions to protect the Bristol Bay fishery from the fate that befell similar salmon

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fisheries in the Pacific Northwest. Some of these efforts failed to become law, while others succeeded. *See Parker, Section 404(c) of the Clean Water Act and the History of State and Federal Efforts to Conserve the Kvichak and Nushagak Drainages of Alaska*, 2 Seattle Journal of Environmental Law 219 (2012)(Parker). Perhaps most significant for the Bristol Bay Assessment is the uninterrupted status of the State of Alaska's effort to protect many of the same waters the EPA is considering for protection under Section 404(c) of the Clean Water Act.

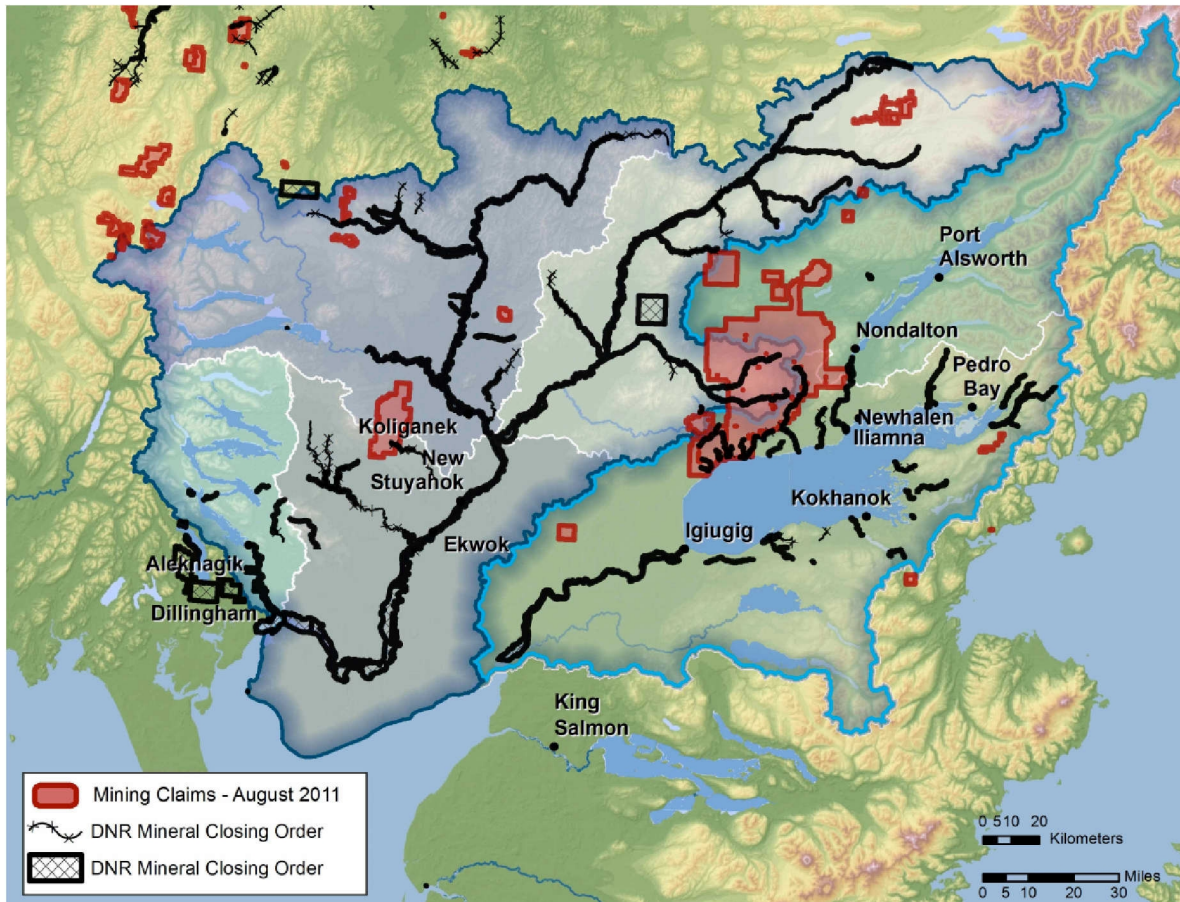
In 1984 the State of Alaska, Department of Natural Resources (ADNR) adopted the first Bristol Bay Area Plan for State Lands. In the plan, ADNR made fish and wildlife protection in Bristol Bay the primary objective:

The Bristol Bay Area Plan places fish and wildlife habitat and harvest as a primary use throughout the Bristol Bay study area. Commercial fishing, sport fishing and hunting, and subsistence activities are all based on renewable fish and wildlife resources. The harvest and non-consumptive use of these fish and wildlife resources are a major economic resource value to residents of the Bristol Bay area, the State of Alaska, and the Nation. Through implementation of the plan (including plan guidelines), fish and wildlife resources and the income and employment generated from the harvest of fish and wildlife resources can be expected to continue indefinitely, thereby providing a sound economic base for Alaska and the Bristol Bay area.

Contemporaneous with the adoption of that Plan ADNR concluded: "The Bristol Bay salmon fishery is, and historically has been, the most valuable economic resource in the Bristol Bay region; providing a major portion of all the salmon harvested in the State of Alaska and the world annually." The Department then adopted Mineral Closing Order (MCO) 393 closing sixty-four anadromous streams encompassing approximately 214,697 acres of state land in Bristol Bay to mining:

The designated anadromous portion of the following streams (designated pursuant to AS 16.05.870) and any state uplands 100 feet from the ordinary high watermark (on both sides of the stream) including islands which are state selected, patented or tentatively approved and excluding islands of other ownership will be closed to new mineral entry in accordance with AS 38.05.185. (MCO 393 p. 6)

Among the streams closed to mining by MCO 393 are the anadromous portions of the Koktuli River and Upper Talarik Creek, the waters most likely to be compromised by the construction of a Pebble Mine.



The findings of ADNR Commissioner Esther Wunnicke justifying MCO 393 mirror many of the observations in the Bristol Bay Assessment:

The 1982 and 1983 commercial sockeye salmon harvest and escapement data for the Bristol Bay and North Alaska Peninsula Fishery Management District show that approximately 75% of the commercial sockeye salmon harvest and 72% of the sockeye salmon escapement originates or spawns in the Nushagak/Mulchatna, Kvichak/Iliamna, Sandy, Bear, or Caribou River drainages where mineral closures have been recommended by the Bristol Bay Area Plan. By closing that portion of the Bristol Bay study area to new mineral entry where the most conflict between fishery production and instream mining would occur, through other plan provisions requiring leasehold location mining, and through enforcement of existing statutes and regulations, protection can be provided to a large portion of the Bristol Bay sockeye salmon run.

Existing state and federal water quality regulations and standards were considered inadequate to guarantee the continued propagation and production of the salmon and other fish resources in the stream waters in the Bristol Bay area. The past and present lack of compliance with and enforcement of these water quality standards in this area and other areas in the state were some of

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the factors considered during the development of the Bristol Bay Area Plan. The existing standard for turbidity, a measure of suspended sediment, allows for levels of sediment which some experts indicate is detrimental to salmon and their eggs and fry. Also, these levels create conditions which make adequate and effective fishery management extremely difficult due to the inability to visually determine escapement. Alaska Statute 16.05.870 gives the Commissioner of Fish and Game authority to regulate activities within designated anadromous streams. Within the 64 streams designated for closure in this order, sufficient protection of fish and game resources (as required in AS 16.05.870 (d)) would likely preclude mining in these areas after a mining claim has already been filed. Actual stream closings more effectively and efficiently achieve the level of fisheries protection required on these 64 streams. The result of these analyses was to close to new mineral entry those streams where highest conflict between the salmon fishery and mining would occur.

In closing, the best interest of the State of Alaska and its residents are served by the closure of the anadromous streams, as identified in the Bristol Bay Area Plan and further depicted in Attachment 3, titled "An Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes, 64 Anadromous Streams Closed to New Mineral Entry," to new mineral entry under the locatable mineral leasing and mining laws of the State of Alaska. (MCO 393 Attachment 2: Justification for Stream Closures pp. 8-9)

It is particularly interesting to note the ADNR closed these waters to mining without reference to any particular mining scenario and considered preemptive closure as more efficient than allowing a mineral claim to proceed only to be later rejected under Alaska laws protecting anadromous waters. At the time ADNR was primarily concerned with instream placer mining and referenced various scientific studies on the affects of placer mining on fish habitat (excessive sediment production, increasing turbidity, changing pH, adding toxic metals to stream water, and altering stream channels and stream flows)(MCO 393 Attachment 2: Justification for Stream Closures p.4) However, the ADNR recognized the potential for renewed interest in the mineral potential of Bristol Bay noting "the knowledge of historic deposits, the favorable geology and mineral terranes" and the announcement of a "precious metal hardrock mineral discovery" east of Iliamna Lake. (MCO 393 Attachment 2: Justification for Stream Closures p.3). The sixty-four streams were closed to mining by ADNR precisely because they "drain watersheds which contain known mineral terranes and have potential for being mined":

Alaska Statute 38.05.185 requires that the Commissioner of Natural Resources must make a finding "that mining would be incompatible with significant surface uses of state land." This allows the Commissioner to close areas to mining only where significant conflicts are likely, and where stream values other than mining are known to be high. *The 64 designated anadromous streams to be closed to mining under the proposed plan all have exceptional values for the region's commercial, subsistence and recreational*

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fisheries. Some streams also have high recreational values for river floating. All 64 streams drain watersheds which contain known mineral terranes and have potential for being mined. (Emphasis Added) *The Bristol Bay Regional Management Plan and Final Environmental Impact Statement*. Bristol Bay Study Group. Alaska Land Use Council, Vol. II pp. J7-8 (1984) (Review and Analysis of Comments Received)

By adopting MCO 393 in 1984 ADNR clearly predetermined that commercial, sport and subsistence fisheries could not co-exist with the mining of known and likely deposits drained by the Koktuli River and Upper Talarik Creek. MCO 393 was in effect in 1986 when Cominco began exploration of the Pebble Prospect and when the Pebble West deposit was discovered in 1988. MCO 393 was still in effect in 2001 when Cominco's claims were acquired by Northern Dynasty.

In 2005 Northern Dynasty announced the discovery of the Pebble East deposit. In that same year the ADNR revisited the Bristol Bay Area Plan for State Lands and in many respects removed the primacy previously accorded to the protection of fish and wildlife habitat in favor of opening more land for mineral development activity. (See Parker at 261) However, despite the potential size and value of the Pebble deposit, the ADNR did not alter MCO 393, stating:

No new mineral closing orders have been adopted as part of this plan. *Users should check for any closure orders that may be in effect for areas in which they intend to work*. One mineral closing order, adopted with the original (1984) Bristol Bay Area Plan closed a large number of streams to mineral entry; Mineral Closing Order 393 closed a large number of streams in the Nushagak-Mulchatna river drainage as well as some on the Alaska Peninsula. (Emphasis Added) (*Bristol Bay Area Plan for State Lands*, April 2005 pp 2-33,34)

The ADNR specifically left in place the orders closing the anadromous portions of the Koktuli River and Upper Talarik Creek. The Pebble Partnership notes in its environmental baseline summary that the deposit "is located on State lands specifically designated for mineral exploration and development." It also notes the deposit "resides near the upper reaches of the Upper Talarik Creek and the South Fork Koktuli River drainages, and is adjacent to the upper reaches of the North Fork Koktuli River drainage." (*The Pebble Environment: a Scientific Overview of Social and Environmental Data in Southwest Alaska*, p.31) The Pebble Partnership fails to mention these drainages contain State lands specifically closed to mineral development.

Unlike the assessment justifying ADNR's adoption of MCO 393 EPA's Bristol Bay Assessment does consider likely build-out scenarios for a mine in the drainages of the Koktuli River and Upper Talarik Creek. These scenarios indicate that mining the Pebble Prospect will likely result in the destruction and dewatering of anadromous portions of the Koktuli River and Upper Talarik Creek. As such the Bristol Bay Assessment confirms the Pebble prospect cannot be mined without violating current Alaska law.

MCO 393 reflects a long established State policy to protect the fisheries of Bristol Bay and prohibit mining that could conflict with those fisheries. If the EPA should invoke Section 404(c) to protect the fisheries of Bristol Bay it will not be abrogating state authority so much as strengthening that authority. In MCO 393 the State articulated well the features of Bristol Bay that needed protection, features no less important today:

The existence and future success of the Bristol Bay salmon fishery depends on the maintenance of anadromous stream habitat for salmon spawning and rearing. Essential conditions for successful salmonid spawning, egg, and fry development are clear, cool, well-oxygenated water, and gravel that is free of sediment, highly permeable and stable. Salmon are a renewable resource and the continued propagation and production of Bristol Bay salmon for commercial, sport, and subsistence harvest constitutes a significant surface use of stream waters and stream bed gravel in the Bristol Bay area. Through maintenance of water quality, stream habitat, and fishery management practices, the Bristol Bay salmon fishery should continue to prosper in the future and contribute to the regional and state economy. (MCO 393 Attachment 2: Justification for Stream Closures p. 1)

2. POTENTIAL RISKS FROM MINING

The EPA's analysis of potential impacts to the Nushagak and Kvichak watersheds from large-scale metallic mining is consistent with and supported by a similar risk assessment published by The Nature Conservancy in October of 2010.

The Bristol Bay Assessment should include an analysis of the potential impacts from fugitive dust.

In November of 2007 The Nushagak-Mulchatna Watershed Council adopted the *Nushagak River Watershed Traditional Use Area Conservation Plan*. The Plan was revised in 2012. A copy of the 2007 plan has been provided to the EPA. The Plan identified four potential risks to traditional uses in the watershed that needed to be addressed over the following fifty years. The Plan set forth a series of strategic actions to address each risk. Mining was identified as one of those potential risks.

In 2005 when the planning process was underway there were no active mines in the watershed to evaluate, but the discovery of the Pebble East deposit had been announced by Northern Dynasty Minerals and the prospect was under intense exploration. The Council approved two major strategic actions in the Plan to address concerns about mining: The first was to conduct an ecological risk assessment so the Council could understand the kind of risks likely to be present if a large deposit like that announced by Northern Dynasty was to be mined; and second to develop a framework of responsible mining practices that would, if followed, protect the traditional uses of the watershed from the risks identified.

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The first strategic action was undertaken in cooperation with The Nature Conservancy. The Council and The Nature Conservancy have been conservation partners since 2000. The Nature Conservancy engaged the firm of Ecology and Environment in 2008 to conduct the risk analysis. After an appropriate peer review, Ecology and Environment and The Nature Conservancy published *An Assessment of Ecological Risk to Wild Salmon Systems from Large-scale Mining in the Nushagak and Kvichak Watersheds of the Bristol Bay Basin* in October of 2010. (TNC Risk Assessment). A copy of the TNC Risk Assessment has been provided to the EPA.

Like the Bristol Bay Assessment, the TNC Risk Assessment reviewed available information about the Pebble deposit, the local environment, the nature of the salmon populations in the vicinity of the deposit (including information and data collected by the independent group of scientists engaged by The Nature Conservancy) and Northern Dynasty's 2006 preliminary mining plan filed in connection with its application to the ADNR for withdrawing water from the Koktuli River and Upper Talarik Creek. The TNC Risk Assessment then reviewed the methods used by the industry to mine a deposit like Pebble to draw conclusions about the type of risks presented, their severity and duration, and the historical capability of the industry to address and mitigate those risks.

The TNC Risk Assessment used a 2.5 billion ton mine scenario based upon the 2006 water rights permit application of Northern Dynasty Minerals and focused on two general stressor categories that may affect the viability of salmon within the Nushagak and Kvichak watersheds. First, as a result of mine development and operation, physical stressors would occur that directly affect the viability of salmon resources. These include: the loss of instream flow [via changes to surface and groundwater] and subsequent alteration of habitat; impacts from road construction, including culvert placement; and, effects from fugitive dust during construction and mining activities. Second, impacts associated with chemical [primarily metals] stressors within surface waters and/or sediments were evaluated for sources including: fugitive dust; slurry pipeline spills; chemical spills; tailings releases from episodic and large scale pollution events; and acid mine drainage (AMD).

The TNC Risk Assessment concluded that the risks to the salmon ecosystems of the Nushagak-Mulchatna and Kvichak watersheds from large-scale mining was "very high":

Of the wide range of risks analyzed in this assessment, the high likelihood of acid mine drainage both during and after mine operations, the potentially catastrophic, though highly uncertain, nature of a large-scale pollution event, and the potential cumulative effects of various ecosystem stressors over time, are reasonable cause for significant concern regarding the long-term abundance, diversity and sustainability of salmon species (and their supporting ecosystems) in this region. Although it is uncertain what will actually occur, based on historical information on physical and chemical stressors gathered for other large mines, and the known effects of mining-related heavy metals to salmon and other biological populations, significant negative impacts to the aquatic ecosystem would be expected over the life of large-scale mines in this region. Additionally, such impacts would be likely to persist and in some cases increase long after mine closure.

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Finally, cumulative risk associated with construction, maintenance and closure of such mines may also be magnified by concurrent or subsequent development of additional mining interests in the region depending on their location and design. (TNC Risk Assessment p. 133)

Similarly, the Bristol Bay Assessment investigated the likely impacts from the loss of instream flow, the loss of wetlands, road construction, slurry pipeline spills; chemical spills; tailings releases from dam failures and acid mine drainage (AMD) to conclude:

Assuming no significant accidents or failures, the development and routine operation of one large-scale mine would result in significant impacts on fish populations in streams surrounding the mine site. Accidents, process failures, and infrastructure failures could increase the spatial scale and severity of mining impacts on fish populations. (Bristol Bay Assessment, Abstract page I)

Unlike the TNC Risk Assessment the Bristol Bay Assessment did not evaluate impacts from fugitive dust. Ore extraction, transport, stockpiling, and other handling will generate fugitive dust. Although such an evaluation would not likely alter the overall conclusion of the Bristol Bay Assessment, fugitive dust represents a significant risk that could carry the impacts of a large mine far beyond the immediate area of the mine footprint. Precise estimates of dust production will need to be developed by the Pebble Partnership based on its proposed operations scenarios and meteorological studies.

The TNC Risk Assessment addresses both the physical stress (page 49) and the chemical stress (page 65) of fugitive dust. The TNC Risk Assessment predicts that fugitive dust could impact 33.5 square miles, or 21,440 acres distributed over three zones with varying impacts depending upon the distance of the zone from the mine footprint (pages 51 – 53)

Pending the Pebble Partnership's detailed studies of dust production and dispersal, a general approximation of the volume of fugitive dust that may be produced by the Pebble Mine can be made using typical values for copper and other metallic mining operations from the Western Regional Air Partners (WRAP) Fugitive Dust Handbook, www.wrapair.org/forums/dejf/fdh/content/Ch11-MineralProductsIndustry_Rev06.pdf. The WRAP Handbook provides a high and low estimate (based on low soil moisture and high soil moisture). The low estimate of emissions from all activities associated with metallic ore mining is about 50 pounds of total suspended particulates (TSP or dust) per ton of ore processed, which is equivalent to about 2.5% of the tonnage excavated and processed. Using this value, over the 78 year life of the larger mine scenario used by the Bristol Bay Assessment, the Pebble Mine extraction and processing of 7,165,000,000 tons of ore (6.5 billion metric tons) could be expected to result in dust emissions of 179,125,000 tons over the operating life of the project:

$$\text{TSP} = 0.025 \times 7,165,000,000 \text{ tons} = 179,125,000 \text{ tons of suspended particulates;}$$

or
Approximately 2,296,000 tons of dust per year ($179,125,000/78$);
or
Approximately 6,292 tons of dust per day ($2,296,000/365$).

To put this dust production into context, if we assume the dust settles back to earth within the 33.5 square miles, or 21,440 acres predicted by the TNC Risk Assessment then this 21,440 acres of land could cumulatively receive about 8,355 tons of dust per acre (179,125,000 tons/21,440 acres = 8355 tons/acre), or about 393 pounds of dust per square foot over the life of the project (8355 tons/acre/43560 ft²/acre = 0.191 tons per ft² x 2000 pounds/ton = 393 pounds/ft²). This is roughlyly equivalent to placing five 80lb standard bags of concrete on each square foot of the affected land. Much of this dust will settle out on snow or nearby bodies of water, and will be washed into streams and rivers during heavy rains. Minerals in the dust will be similar in metal content to the minerals in the ore.

If we assume dust emissions are dispersed over a larger area, then the "pounds per square foot" would be lower. Dispersal of the dust produced by the mining operation over a larger area would mean, however, that the total volume/tonnage of dust falling on areas outside of the mined area would increase.

3. MITIGATION OF RISKS

The mine scenarios analyzed by the Bristol Bay Assessment show the development of large scale metallic mines in the watershed is unlikely to comply with the *Standards and Practices for Responsible Mining in the Nushagak River Watershed* adopted by the Nushagak-Mulchatna Watershed Council.

Upon completion and review of the TNC Risk Assessment the Nushagak-Mulchatna Watershed Council undertook the second strategy from the Nushagak River Traditional Use Area Conservation Plan – the development of a framework for responsible mining in the watershed to address the risks identified. In February of 2011 the Council met to consider and approve a draft framework for circulation and comment. In October of 2011 the Council met and reviewed a revised draft that was adopted and is now embodied in the document entitled: *Standards and Practices for Environmentally Responsible Mining in the Nushagak River Watershed (Standards & Practices)*. The *Standard & Practices* represent the Council's best efforts to outline practices that accommodate mineral development but assure the welfare of the fish resources of the watershed will not be compromised by that development, and that the people who live in the watershed, particularly the indigenous residents who continue to subsist on watershed resources, will be accorded a meaningful opportunity to participate in the decision making process.

If the Pebble Partnership eventually produces a mine plan that is similar to the build-out scenarios used in the Bristol Bay Assessment then it does not appear to be possible, with currently available technology, to build the mine and comply with the *Standards & Practices*. In particular the Bristol Bay Assessment indicates:

- The post closure period will likely be infinite as active management of the tailings facilities will be required in perpetuity;

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- The mine will generate acid and it is uncertain whether discharges of acid in watersheds like the Nushagak and Kvichak can be controlled in perpetuity;
- The mine cannot be built without removing existing ADNR mineral closing orders;
- The release of contaminants into groundwater is virtually certain after mine closure;
- A mine constructed today could not overcome the guidelines of the precautionary principle - too much scientific uncertainty remains about the environment in which the mine would be built and the capability of the industry to mine in that environment without placing subsistence resources, particularly fish, at significant risk

Table I at the end of these comments summarizes the findings of the Bristol Bay Assessment as they apply to the most relevant standards and practices adopted by the Watershed Council. An additional copy of *Standards and Practices for Environmentally Responsible Mining in the Nushagak River Watershed, 2012* is submitted with these comments.

CONCLUSIONS:

The EPA's characterization of the Bristol Bay fishery as a world class fishery and remains so because the habitat is intact is consistent with all previous known assessments of the fishery, including the assessment of ADNR that supports the continued closure of the Koktuli River and Upper Talarik Creek to mineral entry under Alaska law. The fact the commercial fishery entered its 128th year in 2012 is testament to this conclusion of the Bristol Bay Assessment.

The analysis of potential impacts to the Bristol Bay fishery from large-scale metallic mining is consistent with and supported by the TNC Risk Assessment of the same issue. The Bristol Bay Assessment does not currently include an analysis of the potential impacts from fugitive dust. I recommend the EPA review the TNC Risk Assessment on this issue.

If the mine scenarios analyzed by the Bristol Bay Assessment are accurate for the Pebble Prospect then the development of that prospect would run contrary to the Standards and Practices for Responsible Mining in the Nushagak River Watershed adopted by the Nushagak-Mulchatna Watershed Council.

Respectfully Submitted



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Bristol Bay Heritage Land Trust

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Table I

#	Nushagak River Watershed Environmental Standards and Practices for Responsible Mining	EPA Watershed Assessment	Mine will likely violate Standards		
III	Mine Development and Operation		Y	N	?
A	A mine should not require active management in perpetuity	Mine likely to require perpetual management of water to prevent contamination			
B	A mine should not destroy or impair the sustained abundance or genetic diversity of a fish species will be significantly compromised	Mine will significantly impact resident and anadromous fish in the Koktuli and Upper Talarik watersheds, but uncertain whether impacts will significantly impair the sustained abundance or genetic diversity of any fish species in these watersheds			
C	A mine should not require destruction, relocation or removal of anadromous water body that significantly impacts sustained abundance or genetic diversity of a salmon species	Mine will destroy portions of the Koktuli and Upper Talarik watersheds, but uncertain whether impacts will significantly impair the sustained abundance or genetic diversity of any of the resident or anadromous species in these watersheds			
D	A mine should not require water withdrawals will exceed ecological flow needs for fish	Mine will require water withdrawals from the Koktuli and Upper Talarik watersheds, but uncertain whether withdrawals will reduce ecological flow needs for fish in these watersheds.			
E	A mine should not be permitted until perfected and priority instream flow reservations under Alaska Law are in place for fish	Mine will require water withdrawals from the Koktuli and Upper Talarik watersheds, but uncertain whether withdrawals will reduce ecological flow needs for fish in these watersheds. Instream flow reservations for fish have been filed, but not perfected for Koktuli River. EPA Assessment pages			
G	A mine should not require mixing zones				
H	A mine should employ proven methods for controlling dust emissions	Assessment does not address the issue of dust arising from construction or operation of mine.			
I	A mine should not generate acid (acid mine drainage) during operation or closure unless risk is eliminated by methods proven effective at a similar location	Acid mine drainage will result. Uncertain whether a mine can be constructed in the N-K watershed that will contain acid mine drainage in perpetuity.			
J	A mine should not be constructed in areas subject to mineral closing orders	Assessment indicates any mine will require destruction of portions of the Koktuli River and Upper Talarik Creek that are currently protected by mineral closing order 393 established in the 1984 Bristol Bay Area Plan approved by the Alaska Department of Natural Resources and re-affirmed in the 2005 revision.			
K	A mine should not require shallow water waste disposal	Uncertain at this time whether shallow water waste disposal will be required			
L	A mine should not require deep water waste disposal unless such disposal is environmentally benign and will not significantly compromise the sustained abundance or genetic diversity of any anadromous or resident fish species	Uncertain at this time whether deep water waste disposal will be required			
M	A mine should not be permitted unless developer is signatory to International Cyanide Management Code	Uncertain at this time whether cyanide will be required			
N	A mine should not have tailings dams and waste rock dumps that will result in releases of contaminants that will enter groundwater	Releases unlikely during operation, certain after closure.			
O	A mine dewatering plan should eliminate impacts on ground and surface water, including seeps and springs	Impacts on groundwater, surface water, seeps and springs uncertain			
P	a mine should have plan for addressing high impact but low probability events like tailings dam failure	Unlikely during operation. Probable after closure and sometime during next 10,000 years.			
VII	Precautionary Principle				
A	Proponents of mine must resolve Scientific uncertainty about mining impacts on environment.	Considerable uncertainty remains			